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Shaw™
Shaw E & I, Inc.

Geotechnical Laboratory
PO Box 4339
1570 Bear Creek Road
Oak Ridge TN 37830
(865) 482-6497

CERTIFICATE OF ANALYSIS

Stephen Trent
Fluor Hanford, Inc.
825 Jadwin Avenue
Richland, Washington 99352

February 10, 2005

This is the Certificate of Analysis for the following samples:

Shaw Project ID:	**Eberline - Hanford**
Shaw Project Number:	**100846.50000000**
Client Sample Data Group:	H2914
Date Received by Lab:	December 28, 2004
Number of Samples:	One (1)
Sample Type:	Soil

I. Introduction/Case Narrative

One soil sample was received by the Shaw Geotechnical Laboratory on December 28, 2004. The sample was submitted for determination of bulk density, sieve analysis, hydraulic conductivity, specific gravity, and calcium carbonate content. The sample number received was B1BR60.

Please see Appendix A, Sample Number Cross Reference List; Appendix B, Analysis Results; and Appendix C, Chain-of-Custody/Sample Receipt Records.

"I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature."

Reviewed and Approved:

Ralph Cole
Laboratory Manager, Geotechnical Services

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II. Analytical Results/Methodology

REFERENCES: United States Army Corps of Engineers (USACE), Engineer Manual 1110-2-1906, *Laboratory Soils Testing*, appendix II, 1970; United States Environmental Protection Agency, SW846, *Test Methods for Examining Solid Waste, Physical/Chemical Methods*, 3rd ed., Nov 1986 (EPA SW-846). Annual Book of ASTM Standards, Section 4, Construction, Volume 04.08, *Soil and Rock (I)*, and Volume 04.09, *Soil and Rock (II)*, 2004. Shaw Environmental and Infrastructure, Standard Operating Procedures.

Moisture Content of Soil and Rock	**ASTM D 2216**
Bulk Density of Soils	**EM 1110-2-1906**
Particle-size Analysis of Soils	**ASTM D 422**
Hydraulic Conductivity of Porous Materials Using a Flexible Wall Permeameter	**ASTM D 5084**
Specific Gravity of Soil	**ASTM D 854**
Calcium Carbonate Content	**ASTM D 4373**

III. Quality Control

Quality control checks such as duplicates and spikes (QC samples), are not normally applicable to geotechnical testing. This is due largely to the inability of obtaining samples with known characteristics, the heterogenous nature of the samples, and quality control procedures built-in to the analytical method.

QC measures to ensure accuracy and precision of test results include the following:

- 100% verification of all numerical results - raw data entries, transcriptions and calculations entered by lab technicians are checked, recalculated and verified. Most data calculations are performed by computer programs.

- Data validation through test reasonableness - summaries of all test results for individual reports are reviewed to determine the overall reasonableness of data and to determine the presence of any data that may be considered outliers.

- Quality control procedures are built into most standardized geotechnical procedures. For example, liquid limit and plastic limit analyses call for re-analyses and specify acceptance criteria.

- Routine instrument calibration - instruments, gauges and equipment used in testing are calibrated on a routine basis. All instrument calibration follows ASTM or manufacturer guidelines.

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- Maintenance of all past calibration records - calibration records and certification documents of all instruments, gauges and equipment are updated routinely and maintained in the Quality Control Coordinators Quality/Operations files.

- Certified and trained personnel - all technicians are certified by the National Institute for Certification of Engineering Technicians (NICET) in geotechnical soil testing, and are trained in the application of standard laboratory procedures for geotechnical analyses as well as the quality assurance measures implemented by Shaw.

- Quantitative analyses frequently used in geotechnical/physical testing programs do not use QC tools common to wet chemistry or radiochemistry laboratories. Measures not employed in the analysis of samples reported in this report include: laboratory control samples (LCS), blanks, matrix spikes (MS), duplicate analyses, dilutions, digestions, correction factors, surrogate sample analyses, detection limit determinations, control charts, and/or tentatively identified compounds (TICs).

IV. Data Qualification

None.

Appendix A
Sample Cross-Reference List

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SAMPLE NUMBER CROSS-REFERENCE LIST

LAB SAMPLE NO.	CLIENT SAMPLE NO.	MATRIX
BC0518	B1BR60	Soil

Appendix B
Sample Test Results

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BULK DENSITY/DRY DENSITY
EM-1110-2-1906, APPENDIX II

PROJECT NAME: **Eberline - Hanford**

PROJECT NUMBER: **100846.50000000**

LAB SAMPLE NUMBER	CLIENT SAMPLE NUMBER	AVERAGE LENGTH inches	AVERAGE DIAMETER inches	WET WEIGHT grams	MOISTURE CONTENT %	BULK DENSITY pcf	DRY DENSITY pcf
BC0518	B1BR60	5.9943	3.8763	2124.6	39.2	114.4	82.2

Moisture content calculated by ASTM D 2216 based on sample dry weight.
Bulk density is the weight of wet sample divided by the volume of the wet sample (as-received).
Dry density is the weight of the dry sample solids divided by the volume of the original sample.

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PARTICLE-SIZE DISTRIBUTION
ASTM D 422

Project Name Eberline Hanford

Project No. 100846.50000000

Field Sample No. B1BR60

Lab Sample No. BC0518

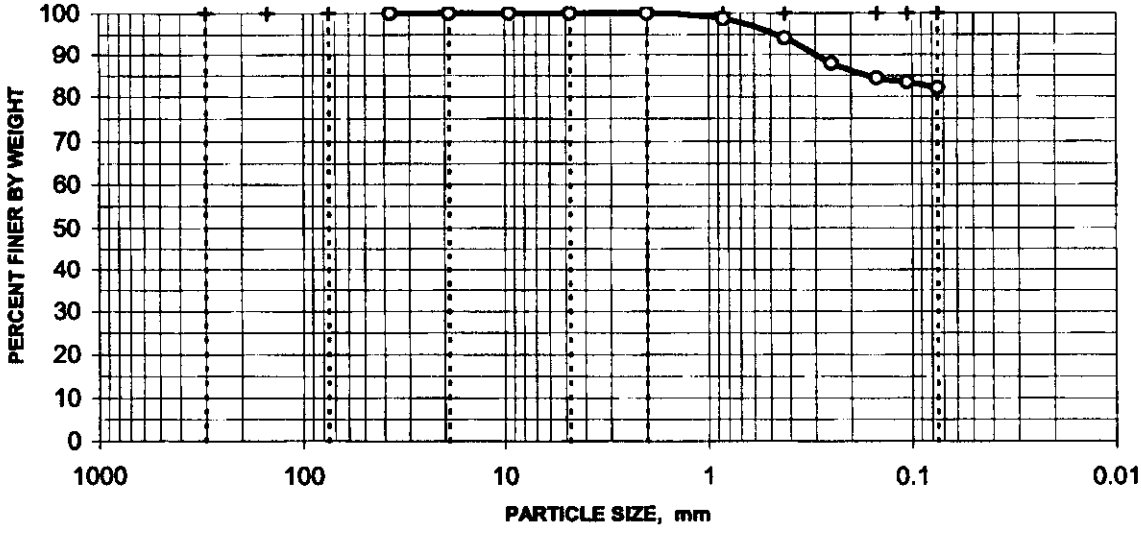
Moisture Content = 39.2%
based on dry sample weight

SIEVE ANALYSIS

	Sieve No.	Diameter mm	Percent Finer
COARSE	3"	75.000	100.0%
	1.5"	37.500	100.0%
	0.75"	19.000	100.0%
	0.375"	9.500	100.0%
	#4	4.750	100.0%
	#10	2.000	100.0%

	Sieve No.	Diameter mm	Percent Finer
FINE	#20	0.850	98.7%
	#40	0.425	94.2%
	#60	0.250	87.9%
	#100	0.149	84.3%
	#140	0.106	83.4%
	#200	0.075	82.0%

DISTRIBUTION CURVE



0.0% Gravel 18.0% Sand 82.0% Silt/Clay

00000008

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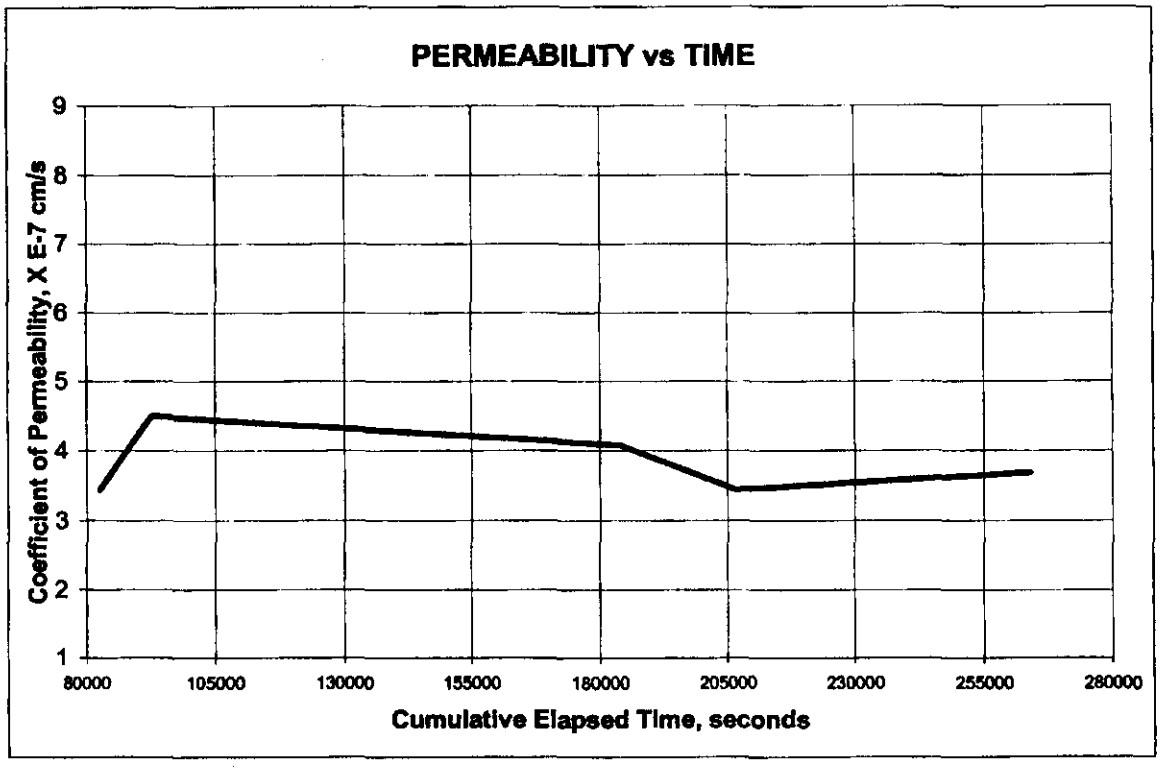
HYDRAULIC CONDUCTIVITY / PERMEABILITY
ASTM D 5084

PROJECT NAME:	Eberline Hanford	CLIENT SAMPLE NO.	B1BR60
PROJECT NO.	100846.50000000	LAB SAMPLE NO.	BC0518

	INITIAL	FINAL
Specimen diameter, cm	6.38	
Specimen length, cm	8.15	
Wet weight of specimen, g.	457.79	
Specimen cross-sect. area, cm^2	32.01	
Water content, %	39.2	
Wet unit weight, pcf	109.6	
Dry unit weight, pcf	78.7	
Degree of saturation, %	94.2	
Specific gravity of solids	2.65	

Hydraulic gradient	17.3
Min. consolidation stress, psi	2.0
Max. consolidation stress, psi	4.0
Total backpressure, psi	8.0
Permeant Fluid	Deaired DI Water

Coefficient of Permeability, cm/s 3.9E-07



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SPECIFIC GRAVITY
ASTM D 854

PROJECT NAME:
Eberline Hanford

PROJECT NUMBER:
100846.50000000

LAB SAMPLE NO.	CLIENT SAMPLE NO.	SPECIFIC GRAVITY
BC0518	B1BR60	2.7638

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Carbonate Content of Soils ASTM D 4373

PROJECT NAME:
Eberline Hanford

PROJECT NUMBER:
100846.50000000

LAB SAMPLE NO.	CLIENT SAMPLE NO.	CO3 [%]
BC0518	B1BR60	0

Appendix C
Chain-of-Custody and Request-for-Analysis Records

Fluor Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F04-033-028	PAGE 1 OF 1

COLLECTOR	COMPANY CONTACT	TELEPHONE NO.	PROJECT COORDINATOR	PRICE CODE 8N	DATA TURNAROUND
Alexander/Gent/Thomas	TRENT, SJ	373-5869	TRENT, SJ	AIR QUALITY ☐	45 Days / 45 Days
SAMPLING LOCATION	**PROJECT DESIGNATION**		**SAF NO.**		
200-ZP-1/C4301/435-440 ft	200-ZP-1 Characterization Sampling and Analysis - Soil		F04-033		
ICE CHEST NO. GRP-03-009	**FIELD LOGBOOK NO.**	**COA** 119325ES10	**METHOD OF SHIPMENT** Federal Express		
SHIPPED TO Shaw Group	**OFFSITE PROPERTY NO.** SUPTR 14548		**BILL OF LADING/AIR BILL NO.** SUPTR 14548		

MATRIX*	POSSIBLE SAMPLE HAZARDS/ REMARKS	PRESERVATION	None										
A=Air, DL=Drum Liquids, DS=Drum Solids, L=Liquid, O=Oil, S=Soil, SE=Sediment, T=Tissue, V=Vegetation, W=Water, WI=Wipe, X=Other	Rad Info B1BR60 SDG# H2914	TYPE OF CONTAINER	Split Spoon Liner										
		NO. OF CONTAINER(S)	2										
		VOLUME	1000g										
	SPECIAL HANDLING AND/OR STORAGE	SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS										

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME										
B1BR60	SOIL	12/15/04	1645	X									
BC 0518													

CHAIN OF POSSESSION — **SIGN/ PRINT NAMES**

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
PMGENT/	12/15/04 2130	REFRIG #1	12/15/04 2130
M.G. Bauthier/M.G. Bauthier	12/16/04 1016	M.G. Bauthier/M.G. Bauthier	12/16/04 1016
M.G. Bauthier/M.G. Bauthier	12/16/04 1015	FedEx	
FedEx	12/20/04 10:30		12/20/04 8:30

SPECIAL INSTRUCTIONS

(1)Bulk Density - D2937; Particle Size (Dry Sieve) - D422; Calcium Carbonate Content; Saturated Hydraulic Conductivity; Particle Density - D854;

#1 GW = 2,683 KG
#3 GW = 2,876 KG

TO SHAW LAB

LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
	SHAW	12/28/04 @ 1030	
FINAL SAMPLE DISPOSITION	**DISPOSAL METHOD**	**DISPOSED BY**	**DATE/TIME**

A-6003-618(03/03)

0000014

SDG# H2914

PAGE 1 Eberline Srvces CHAIN OF CUSTODY ORD # R4-12-219

12/21/04 14:23:47 WORK ID: SAF# F04-033 SDG H2914

RCVD: 12/20/04 DUE: 02/03/05 KEEP: 02/03/06 DISP: S

DASH	SAMPLE IDENTIFICATION	STORED	TESTS
01A-S	B1BR60	HAW	DISPOS E329S E331S E335S E342S E345S

BC 0518

RELEASED BY	DATE	TRANSFERRED TO	DATE	RECEIVED BY	DATE
[signature]	12/22/04	[signature]	12/22/04	[signature]	12/23/04

00000014